What is claimed is:

1. A method for producing oxygen, comprising the steps of:

cooling air to a temperature less than a liquefaction temperature of oxygen and higher than a liquefaction temperature of argon with a cryocooler to obtain liquefied oxygen, and

separating the liquefied oxygen from nitrogen and the argon in gas phases, or from the argon in a gas phase.

2. A method for producing oxygen according to claim 1, further comprising, before the step of cooling the air, conducting at least one of the step of preliminary cooling the air and the step of removing moisture in the air, wherein the air to be introduced to a cooling part of the cryocooler is cooled by a heat exchange with a low-temperature gas including the nitrogen gas and argon gas and separated in the step of separating the oxygen.

3. A method for producing oxygen according to claim 1, further comprising the step of separating the nitrogen in the air with a PSA method to obtain an oxygen-rich gas in advance before introducing the air into a cooling part of the cryocooler.

4. A method of producing oxygen according to claim 1, further comprising the steps of measuring a temperature of the liquefied oxygen, and controlling an output of the cryocooler to maintain the temperature at a predetermined value.

5. A method of producing oxygen according to claim 4, wherein, in the step of measuring the temperature of the liquefied oxygen, the temperature of the liquefied oxygen is measured via heat-transferal means immersed in the liquefied oxygen.

6. A method for producing oxygen according to claim 1, wherein the cryocooler is a pulse-tube cryocooler.

7. A oxygen-production device for producing oxygen, comprising:

a pulse-tube cryocooler for cooling atmospheric air to liquefy the oxygen, said pulse-tube cryocooler having a heat regenerator, a cold head, and a pulse tube;

a main container for obtaining and retaining liquefied oxygen having an air inlet, an output port for the liquefied oxygen, and an outlet for residual gases other than the liquefied oxygen, said main container retaining the heat regenerator, the cold head and the pulse tube therein;

a temperature sensor for measuring a temperature of the liquefied oxygen; and

a control device electrically connected to the temperature sensor for controlling an output of the pulse-tube cryocooler according to the temperature measured by the temperature sensor.

8. An oxygen-production device according to claim 7, wherein said main container includes a liquid storage container for generating the liquid oxygen provided with the temperature sensor therein, and a heat exchanger thermally connected to the cold head, said air introduced into the heat exchanger

being cooled and supplied into the liquid storage container, and the liquefied oxygen being separated from nitrogen and argon in gas phases in the liquid storage container.

9. An oxygen-production device according to claim 7, wherein said main container includes a liquid storage container provided with the temperature sensor therein and thermally connected to the cold head, and the liquefied oxygen being separated from nitrogen and argon in gas phases in the liquid storage container.

10. An oxygen-production device according to claim 9, wherein said liquid storage container is provided with a radiator member thermally connected to the cold head.

11. An oxygen-production device according to claim 7, further comprising a heat exchanger for preliminarily cooling the air to be introduced into the container through heat exchange between the air to be introduced and a low-temperature gas including nitrogen and argon which were separated in the main container.

12. An oxygen-production device according to claim 7, further comprising a dehumidifier for removing moisture from the air to be introduced into the main container through coldness of a low-temperature gas including nitrogen and argon which were separated in the container.

13. An oxygen-production device according to claim 12, wherein said dehumidifier includes a main housing having an

air introduction pipe; a low-temperature gas pipe with a radiation fin passing through the main housing; and a selector valve arranged below the main housing for switching the air and condensed water.

14. An oxygen-production device according to claim 13, wherein said dehumidifier includes an adsorbent in the main housing for adsorbing moisture therein.

15. An oxygen-production device according to claim 7, further comprising a pair of dehumidifiers provided with air introduction pipes, low-temperature gas introduction/discharge pipes, and selector valves so that when the air is introduced into the main container through one of the humidifiers to liquefy the oxygen, the air flows through the other of the dehumidifiers to discharge condensed water in the main container to outside through the selector valve.

16. An oxygen-production device according to claim 7, further comprising a pair of dehumidifiers provided with air introduction pipes, low-temperature gas introduction/discharge pipes, and selector valves, said dehumidifiers being connected to each other through the low-temperature gas discharge pipes, said air introduction pipes having air selector valves so that condensed water in a main housing of one of the dehumidifiers is discharged together with low-temperature gas discharged from a main housing of the other of the dehumidifiers through one of the selector valves.